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Feb 23, 1999

DERWENT-ACC-NO: 1999-209634

DERWENT-WEEK: 199921

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TITLE: Biodegradable sheet used in paddy field - includes predetermined proportion of fillers, used for surface treatment, added to specific amount of biodegradable aliphatic polyester resin which is laminated with paper or non- woven fabric

PATENT-ASSIGNEE:

ASSIGNEE

SHINETSU POLYMER KK

CODE

SHPL

PRIORITY-DATA: 1997JP-0210392 (August 5, 1997)

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INT-CL (IPC): B32 B 27/10; B32 B 27/12; B32 B 27/36

ABSTRACTED-PUB-NO: JP11048436A

BASIC-ABSTRACT:

NOVELTY - The biodegradable sheet includes 100 weight parts of biodegradable aliphatic polyester resin to which is added 10- 150 weight parts of fillers used for surface treatment. The sheet is laminated with paper or non-woven fabric.

USE - In paddy field.

ADVANTAGE - Prevents water leakage. Obtains sheet with sufficient mechanical strength and that which can be easily and quickly degraded by microorganisms.

CHOSEN-DRAWING: Dwg.0/0

TITLE-TERMS: BIODEGRADABLE SHEET PADDY FIELD PREDETERMINED PROPORTION FILL SURFACE TREAT ADD SPECIFIC AMOUNT BIODEGRADABLE ALIPHATIC POLYESTER RESIN LAMINATE PAPER NON WOVEN FABRIC

DERWENT-CLASS: A23 A97 P73

CPI-CODES: A05-E01D; A08-R01; A09-A07; A11-B09A2; A12-W04A;

ENHANCED-POLYMER-INDEXING:

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Polymer Index [1.2] 018 ; ND01 ; Q9999 Q6702\*R ; Q9999 Q6768 Q6702 ; Q9999 Q6757 Q6702  
; B9999 B3021 B3010 ; K9687 K9676 ; K9712 K9676 ; K9483\*R ; K9518 K9483 ; K9563 K9483

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C1999-061588

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TECHNICAL PROBLEM

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[Object of the Invention] Therefore, it is offering the advantageous biodegradability sheet for agriculture in cost while the technical problem of this invention solves the above-mentioned conventional trouble, and processing after use is easy for it and it can fully moreover maintain an intensity.

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[Translation done.]

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**EFFECT OF THE INVENTION**

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[Effect of the invention] According to the biodegradability sheet for agriculture of this invention, even if it adds so much the bulking agent by which surface treatment was carried out in biodegradability polyester resin, a fall of physical properties is suppressed, and by laminating this resin by paper or the nonwoven fabric further, even if it is cheap and it moreover makes a resin layer thin, sufficient intensity is obtained. Moreover, since necessary minimum is sufficient as the thickness of the resin layer which constitutes the biodegradability sheet for agriculture, paper, or a nonwoven fabric, the decomposition by the microorganism becomes quicker [ the catabolic rate at the time of laying underground among soil is quick, and ], since hydrolysis in soil will be promoted, if the alkaline bulking agent is added, and if the starchy bulking agent is added, the decomposition by the microorganism can be made still quick. Furthermore, since the resin laminates the biodegradability sheet for agriculture of this invention as compared with the case of only paper, even if it is damp to rain, it does not cause an on-the-strength fall and is not torn at the time of use. Moreover, the calorific value when destroying by fire does not damage about 1/2 and the incinerator of a usual biodegradability resin, either, and processing after use is easy for it.

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**CLAIMS**

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[Claim]

[Claim 1] The biodegradability sheet for agriculture characterized by coming to laminate the resin material which comes to add the bulking agent 10 by which surface treatment was carried out, - 150 weight section in paper or a nonwoven fabric to the biodegradability aliphatic polyester resin 100 weight section.

[Claim 2] The biodegradability sheet for agriculture of claim 1 publication with which the bulking agent by which surface treatment was carried out carries out surface treatment of at least one sort chosen from a calcium carbonate, a calcium hydroxide, clay, talc, an aluminum hydroxide, and a magnesium hydroxide by at least one sort chosen from a \*\*\*\*\* coupling agent, an aluminum coupling agent, an acetylene glycol, and its derivative.

[Claim 3] The biodegradability sheet for agriculture of claim 1 publication with which the bulking agent by which surface treatment was carried out carries out surface treatment of at least one sort chosen from a silica, a ceramic balloon, a glass balloon, a glass bead, and paper manufacture sludge incineration ashes by the epoxy system silane coupling agent.

[Claim 4] The biodegradability sheet for agriculture of claim 1 publication with which the bulking agent by which surface treatment was carried out carries out surface treatment of the starch by at least one sort chosen from an acetylene glycol and its derivative.

[Claim 5] the basis weight of paper or a nonwoven fabric -- 5-50g/m<sup>2</sup> it is -- biodegradability sheet for agriculture of claim 1 publication

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**TECHNICAL FIELD**

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[The technical field to which invention belongs] the hole of the ridge according [ put this invention on the ridge of the sheet especially used for biodegradability aliphatic polyester resin by \*\*, and weeding out, shading and the object for hotbeds about the biodegradability sheet for agriculture which laminated the resin material which comes to add the bulking agent by which surface treatment was carried out, and various kinds of papers or nonwoven fabrics, or a rice field, and ] to prevention of leakage of water, and \*\*\*\* -- it is related with the sheet for preventing an aperture and preventing the same leakage of water

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DETAILED DESCRIPTION

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[Detailed description]

[0001]

[The technical field to which invention belongs] the hole of the ridge according [ put this invention on the ridge of the sheet especially used for biodegradability aliphatic polyester resin by \*\*, and weeding out, shading and the object for hotbeds about the biodegradability sheet for agriculture which laminated the resin material which comes to add the bulking agent by which surface treatment was carried out, and various kinds of papers or nonwoven fabrics, or a rice field, and ] to prevention of leakage of water, and \*\*\*\* -- it is related with the sheet for preventing an aperture and preventing the same leakage of water

[0002]

[Prior art] Conventionally, as a sheet for agriculture used for weeding out, shading, and hotbeds, the comparatively thin polyethylene sheet or the sheet made from paper which used used paper as the base was used. Moreover, the sheet and biodegradability sheet which consist of the material same also as a sheet for agriculture used in order to prevent the leakage of water of the ridge of a rice field etc. were used.

[0003] Since soil and mud adhere in these, even if the polyethylene sheet is difficult to collect and it moreover leaves it after use, in order not to rot, technique only has carrying out incineration disposal and it had the problem the calorific value at the time of incineration damaged many incinerators, or generate a toxic substance at the time of incineration. On the other hand, the sheet made from paper having un-arranged [ of taking too much the time which decomposition takes ], although it decomposed in earth and sand when cultivating after use. Furthermore, in order to hold the endurance of this sheet, there was disadvantage of a certain amount of thickness having been required, and being further hard coming to decompose the cellulose which is hard to decompose. Moreover, in the case of paper, when it got wet to rain, and an intensity fell and this moreover dried, it became hard and there were problems, such as damaging a seedling. Moreover, when using it by independent [ it ], the biodegradability sheet had to be made to some extent thick in order to maintain a required intensity, therefore since the material unit price was high, it was disadvantageous in cost.

[0004]

[Object of the Invention] Therefore, it is offering the advantageous biodegradability sheet for agriculture in cost while the technical problem of this invention solves the above-mentioned conventional trouble, and processing after use is easy for it and it can fully moreover maintain an intensity.

[0005]

[The means for solving a technical problem] In order to solve the above-mentioned technical problem, as a result of repeating a research zealously, by fabricating the sheet which laminated the resin material which comes to add a bulking agent, and the paper or the nonwoven fabric of the amount of specialization by which surface treatment was carried out to biodegradability aliphatic polyester resin, this invention persons find out the practically very desirable biodegradability sheet for agriculture, and came to complete this invention. That is, the biodegradability sheet for agriculture of this invention laminates the resin material which comes to carry out 10-150 weight section addition of the bulking agent by which surface treatment was carried out in paper or a nonwoven fabric to the biodegradability resin group polyester resin 100 weight section.

[0006] The bulking agent by which surface treatment was carried out Moreover, a calcium carbonate, a calcium hydroxide, At least one sort chosen from clay, talc, an aluminum hydroxide, and a magnesium hydroxide What carried out surface treatment by at least one sort chosen from a \*\*\*\*\* coupling agent, an aluminum coupling agent, an acetylene glycol, and its derivative, Or at least one sort chosen from the ashes which may have the paper manufacture sludge which makes a principal component a silica, a ceramic balloon, a glass balloon, a glass bead, and a silica incinerated The thing which carried out surface treatment by the epoxy system silane coupling agent, or the thing which carried out surface treatment of the starch by at least one sort chosen from an acetylene glycol and its derivative is adopted preferably. By using these bulking agents by which surface treatment was carried out, a physical-properties fall is suppressed and high restoration to a biodegradability material is enabled. Furthermore, for the paper or the nonwoven fabric to laminate, the basis weight is 5-50g/m<sup>2</sup>. It is more desirable than an intensity top that it is within the limits. The well-balanced suitable sheet for biodegradability agriculture can be obtained by adopting these configurations.

[0007]

[Gestalt of implementation of invention] Hereafter, this invention is explained in detail. The biodegradability aliphatic polyester resin used for this invention Although it is not limited especially if it has a biodegradability, specifically The multiple-valued

carboxylic acids illustrated by a malonic acid, a succinic acid, a glutaric acid, an adipic acid, a sebacic acid, a fumaric acid, a maleic acid, dodecanoic acid, the malic acid, the tartaric acid, the citric acid, etc., these anhydrides, etc., Ethylene glycol, a propylene glycol, butanediol, hexandiol, The condensation-polymerization object with polyhydric alcohol, such as octanediol, the Deccan diol, a glycerol, and a trimethylol propane The condensation-polymerization object of a hydroxy acid like the ring-opening-polymerization object (poly caprolactone) of cyclic ester, such as a lactide which is the annular dimer of a lactic acid, and epsilon-caprolactone, a lactic acid, hydroxybutyric acid, and a hydroxy valeric acid is illustrated, and it is used as one sort or two sorts or more of mixture.

[0008] The bulking agent used for this invention has an inorganic bulking agent and an organic bulking agent, the incineration ashes of a calcium carbonate, a calcium hydroxide, clay, talc, an aluminum hydroxide, a magnesium hydroxide, a silica, a ceramic balloon, a glass balloon or a glass bead, and paper manufacture sludge etc. are mentioned as an inorganic bulking agent, and starchy chaff powder [, such as powder, ], such as a potato, a sweet potato, wheat, a Zea mays, tapioca, and rice bran, is mentioned as an organic bulking agent. These bulking agents are used as one sort or two sorts or more of mixture, and can complement a property mutually by mixing. [0009] Among these, it is more desirable not to make the surface treatment by the fatty acid etc., although any of the quality of heavy and light \*\* colloid will be sufficient and the thing of surface treatment will be used about a calcium carbonate, if a mean particle diameter is 0.1-6 micrometers. Moreover, since influence appears in the viscosity at the time of molding, and physical properties, as for the calcium carbonate with a small particle size, it is more desirable [ the differentiation in the specific surface area by the size of particle size ] than the calcium carbonate with a big particle size to lessen an addition. The thing of the same particle size as a calcium carbonate and surface treatment is used also about a calcium hydroxide, clay, talc, an aluminum hydroxide, a magnesium hydroxide, or a silica.

[0010] About a ceramic balloon, a glass balloon, and a glass bead, the thing of the domain whose mean particle diameter is 1-30 micrometers is good. These spherical bulking agents have the small viscosity elevation at the time of restoration, since especially a ceramic balloon and a glass balloon are hollow, its specific gravity is small, and since the specific gravity of a biodegradability resin also becomes small by this addition, it becomes advantageous in respect of a cost. Moreover, if the ceramic balloon of a true sphere and a glass balloon are used, since a directivity will not appear in a biodegradability resin by this addition, there is an advantage from which the product which does not have a directivity in the case of molding is obtained.

[0011] the starch as an organic bulking agent may be a potato, a sweet potato, wheat, a Zea mays, tapioca, rice bran, etc., and although various configurations are taken, the content of an amylose and an amylopectin differs also from its polymerization degree and various particle size also comes out according to the modality of the material, as long as a mean particle diameter is within the limits of 0.1-30 micrometers, it may be which starch Moreover, since starch has slippage and it can give the slippage at the time of molding to the mixture with a biodegradability resin, without adding a lubricant, it becomes advantageous in respect of the time of combination, or a cost.

[0012] As a surface treatment agent for carrying out surface treatment of these bulking agents, in the case of the paper manufacture sludge incineration ashes and the silica to which a bulking agent makes a principal component a ceramic balloon, a glass balloon, a glass bead, and a silica, an epoxy system silane coupling agent (Table 1) is good, and when it is inorganic bulking agents other than these, a \*\*\*\*\* system coupling agent (Table 2), an aluminum coupling agent (Table 3) or an acetylene glycol, and this derivative (Table 4) are suitable for it.

[0013] In these, the inorganic fraction of this coupling agent carries out orientation of an epoxy system silane coupling agent and the \*\*\*\*\* system coupling agent to an inorganic bulking agent, and the type where an organic fraction goes into a resin is taken. That is, it becomes the structure which wrapped the inorganic substance in the organic substance, and uniform variance is attained, and since a physical-properties fall can be made into the minimum, it is preferably adopted by the interaction with a resin.

[0014]

[Table 1]

	化 学 名	構 造 式
KBM503	$\beta$ -(3,4-エポキシシクロヘキシル) エチルトリメトキシシラン	
KBM403	$\gamma$ -グリシドキシプロピル トリメトキシシラン	
KBE402	$\gamma$ -グリシドキシプロピル メチルジエトキシシラン	
MAC 2101	マイクロモレキュラーカップリング剤	$\begin{array}{ccccccc} \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 \\   & &   & &   & &   \\ \text{CH}_3 - \text{Si} - \text{O} - & \left[ \begin{array}{c} \text{CH}_3 \\   \\ \text{SiO} \\   \\ \text{CH}_3 \end{array} \right]_l & \left[ \begin{array}{c} \text{CH}_3 \\   \\ \text{SiO} \\   \\ \text{X} \end{array} \right]_m & \left[ \begin{array}{c} \text{CH}_3 \\   \\ \text{SiO} \\   \\ \text{Y} \end{array} \right]_n & \left[ \begin{array}{c} \text{CH}_3 \\   \\ \text{SiO} \\   \\ \text{Z} \end{array} \right]_o & \left[ \begin{array}{c} \text{CH}_3 \\   \\ \text{SiO} \\   \\ \text{CH}_3 \end{array} \right] & \text{Si} - \text{CH}_3 \\   & & & & & &   \\ \text{CH}_3 & & & & & & \text{CH}_3 \end{array}$ <p>X: アルコキシシリル基, 1, m, n, o; それぞれ正の整数 Y: 反応性有機官能基 (エポキシ基) Z: 有機物との相溶性を高める官能基 (ポリエーテル, アルキル, アラルキル基等)</p>

[0015]

[Table 2]

化 学 名	構 造 式
イソプロピル トリオクタノイルチタネート	
イソプロピルジメタクリロイル イソステアロイルチタネート	
イソプロピルトリ(ドデシルベンゼンスルホニル)チタネート	
イソプロピルイソステアロイル ジアクリロイルチタネート	
イソプロピルトリ(ジオクチルホスフェート)チタネート	
イソプロピルトリクミルフェニ ルチタネート	
テトライソプロピルビス(ジオ クチルホスファイト) チタネート	$(\text{CH}_3)_2\text{CH}-\text{O}-\text{Ti} \cdot [\text{P}-(\text{OC}_8\text{H}_{17})_2(\text{OH})]_2$

[0016]

[Table 3]

化 学 名	化 学 構 造 式
アセトアルコキシ アルミニウム ジイソプロピレート	



[0017]

[Table 4]

化 学 名	構 造 式	商 品 名
2, 4, 7, 9- テトラメチル-5- デシン-4, 7- ジオール (I)	$  \begin{array}{ccccccc}  \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 \\    & &   & &   & &   \\  \text{CH}_3 - \text{CH} - \text{CH}_2 - & \text{C} = \text{C} = & \text{C} - \text{CH}_2 - & \text{CH} - \text{CH}_3 \\    & &   & & & & \\  \text{OH} & & \text{OH} & & & &   \end{array}  $	Surfynol 104 (#-74/-# 104)
(I) のブレンド		Surfynol 104E (#-74/-# 104E)
		Surfynol 104B (#-74/-# 104B)
		Surfynol 104A (#-74/-# 104A)
		OLFINE STC (#74/> SPG)
		OLFINE SPC (#74/> SPC)
(I) の酸化エチレン付加体	$  \begin{array}{ccccccc}  \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 \\    & &   & &   & &   \\  \text{CH}_3 - \text{CH} - \text{CH}_2 - & \text{C} = \text{C} = & \text{C} - \text{CH}_2 - & \text{CH} - \text{CH}_3 \\    & &   & & & & \\  \text{O} & & \text{O} & & & & \\    & &   & & & & \\  \text{CH}_2 & & \text{CH}_2 & & & & \\    & &   & & & & \\  \text{CH}_2 & & \text{CH}_2 & & & & \\    & &   & & & & \\  \text{O} & & \text{O} & & & & \\    & &   & & & & \\  \text{H} & & \text{H} & & & &   \end{array}  $	$m+n=3.5$ Surfynol 440 (#-74/-# 440)
		$m+n=10$ Surfynol 455 (#-74/-# 455)
		$m+n=20$ Surfynol 455 (#-74/-# 455)
3, 6-ジメチル-4-オクタン-3, 6-ジオール	$  \begin{array}{ccccccc}  \text{CH}_3 & & & & \text{CH}_3 & & \\    & & & &   & & \\  \text{CH}_3 - \text{CH}_2 - & \text{C} = \text{C} = & \text{C} - \text{CH}_2 - & \text{CH}_3 \\    & &   & & \\  \text{OH} & & \text{OH} & &   \end{array}  $	Surfynol 82 (#-74/-# 82)

[0018] As a starchy surface treatment agent which is an organic bulking agent on the other hand, an acetylene glycol and its derivative are desirable. This acetylene glycol is a powerful surfactant, orientation is carried out to OH base in a starch, and since an organic fraction serves as the type where it faces to a resin, when uniform variance into a resin and an interaction arise, it is thought that a physical-properties fall becomes small. Thus, it cannot expect distributing uniformly the starchy powder which is an organic bulking agent in a resin to a usual surface treatment agent, and it is the big effect of an acetylene glycol.

[0019] About the technique of the surface treatment of these bulking agents, even if it processes the integral blend on a wet method (technique by hydrolysis), dry process, and a roll mill etc. by which technique, it does not interfere. As for the addition of the surface treatment agent in this case, it is desirable that it is within the limits of 0.5-5PHR, by less than 0.5 PHRs, if the effect as a surface treatment agent can seldom expect but exceeds 5PHRs conversely, since the surface treatment agent is expensive, low-cost-ization of an addition will become impossible and it will be inferior to economical efficiency in it.

[0020] this invention is that by which the addition of these bulking agents by which surface treatment was carried out is added to the aforementioned biodegradability aliphatic polyester resin 100 weight section according to a property required within the limits of 10 - 150 weight section. The effect which this addition exerts on the viscosity control by addition of a bulking agent, an intensity, a fluidity, etc. under in 10 weight section will decrease, if 150 weight section is exceeded conversely, viscosity will go up too much, a fall of a moldability and physical properties will become remarkable, and practicality will be lost.

[0021] Since the biodegradability aliphatic polyester resin which added the bulking agent by which surface treatment was carried out is what must not usually start a photodegradation at the time of use, it may add the plasticizer for adding an ultraviolet ray absorbent, an antioxidant, etc. and giving the pigment and flexibility for tinction etc. Furthermore, there is still little calorific value, the biodegradability aliphatic polyester resin to which calorific value added the bulking agent by which surface treatment was carried out although biodegradability aliphatic polyester resin was usually about 1, such as polyethylene, 2 is set to 1/3 - 1/4, such as polyethylene, and its incineration processing with an incinerator is also satisfactory at all. Moreover, according to the modality of inorganic bulking agent, eight or more alkaline things have pH, and these can promote hydrolysis of a resin in soil and can speed up the catabolic rate by the microorganism. Furthermore, since the resin by the microorganism is made to decompose, the starchy addition which is an organic bulking agent can also expect the effect that decomposition is promoted more.

[0022] A biodegradability sheet is obtained when this invention laminates the resin material which comes to add the bulking agent with which surface treatment of the amount of specialization illustrated above was carried out in paper or a nonwoven fabric to biodegradability aliphatic polyester resin. When it extrudes with the resin material of the above-mentioned biodegradability and being laminated, this paper or nonwoven fabric is used in order to fully enter between the scale divisions of paper or a nonwoven

fabric and to strengthen combination with a resin. For this reason, in the comparatively coarse concrete target of scale division, the weighing capacity is 5-50g/m<sup>2</sup>. It is more desirable than an intensity top to use a thing within the limits. The thing of the non-coating which consists of rayon which is the natural cellulose or regenerated cellulose by which surface treatment is not carried out at all that what is necessary is just what has a biodegradability as paper to laminate, or cellophane is mentioned. Moreover, as a nonwoven fabric, it could be manufactured by any of a wet method or dry process, and fiber should just have a biodegradability. Especially in the case of the nonwoven fabric manufactured with dry process, it is required for the binder used for this to also have a biodegradability.

[0023] the molding using T-die etc. of the resin material which consists of biodegradability aliphatic polyester resin which carried out specified quantity combination of the above-mentioned bulking agent by which surface treatment was carried out in order to have manufactured the biodegradability sheet for agriculture of this invention -- paper or a nonwoven fabric -- extruding -- a lamination -- or a dry laminate is carried out and it is produced by the biodegradability sheet for agriculture

[0024]

[Example] Hereafter, although this invention is concretely explained based on an example, this invention is not limited only to these publications.

[an example 1] -- aliphatic -- polyester resin:Bionolle 1001 (the Showa High Polymer Co., Ltd. make --) A tradename, 1, the condensation-polymerization object 100 weight section of 4-butanediol and a succinic acid, The whitening 120 weight section of 2 micrometers of the mean particle diameters which added the tetrapod isopropyl screw (dioctyl phosphite) \*\*\*\*\* 1 weight section as a \*\*\*\*\* coupling agent, The stearin acid 2 weight section and the alkylbenzene sulfonic-acid calcium:7764(Akishima chemical-industry company make, tradename) 3 weight section were mulled for 5 minutes after melting of a resin by the 120-degree C roll mill. This was taken out as the shape of a sheet, and it put into the frame mold with a thickness of 2mm, it pressed for 5 minutes at 140 degrees C, and considered as the sheet with a thickness of 2mm. It pierced by the No. 2 dumbbell of JIS convention from this sheet, the test sample was produced, the tension test was performed at the rate of 200mm/min, tensile strength, 100% modulus, and elongation were measured, and the result was shown in Table 5.

[0025] Next, it ground and the pellet was produced, after cooling the aforementioned sheet to a room temperature. While this was extruded in thickness of 40 micrometers using the extruder of 65mm of the diameters of a screw on conditions with 140-230 degrees C [ of cylinder temperatures ], and a die temperature of 235 degrees C, it laminated with the pulp which consists of recovery used paper with 50 micrometers [ in 20g of the basis weights for a lamination/, m2, and thickness ], and a width of face of 700mm, and the lamination sheet of 70 micrometers of \*\*\*\*\*s was obtained. (since [ however, ] the resin has entered into the fiber of paper -- \*\*\*\*\* of a lamination sheet -- it did not become simple total)

About the obtained lamination sheet, it is JIS. When the tension test was performed on the same conditions as the above based on K6734, it was the thing of the intensity which can be enough satisfied as a sheet for agriculture.

[0026] The corn-starch Y100 weight section (Japan Maize Products Co., Ltd. make) which added the [example 2] aliphatic polyester resin:Bionolle 1001 (above) 100 weight section and the ethyleneoxide adduct:\*\*\*\*\* Norian 440(\*\*\*\* chemical-industry company make, tradename) 1 weight section of an acetylene glycol was mulled for 5 minutes after melting of a resin by the 120-degree C roll mill. This was taken out as the shape of a sheet, and was pierced like the example 1, the sample for an examination was produced, same measurement was performed, and the result was shown in Table 5. Next, it ground and the pellet was produced, after cooling the above-mentioned sheet-like object to a room temperature. While this was extruded in thickness of 40 micrometers like the example 1, it laminated with the pulp which consists of recovery used paper with 30 micrometers [ in 12g of the basis weights for a lamination/, m2, and thickness ], and a width of face of 700mm, and the lamination sheet of 50 micrometers of \*\*\*\*\*s was obtained. (since [ however, ] the resin has entered into the fiber of paper -- \*\*\*\*\* of a lamination sheet -- it did not become simple total)

About the obtained lamination sheet, it is JIS. When the tension test was performed on the same conditions as the above based on K6734, it was the thing of the intensity which can be enough satisfied as a sheet for agriculture.

[0027] [an example 3] -- aliphatic -- polyester resin:Bionolle 3010 (the Showa High Polymer Co., Ltd. make --) The copolymer 100 weight section of tradename, 1, and 4-butanediol, a succinic acid, and an adipic acid, amount epoxy system silane-coupling-agent:MAC2101 (Japanese uni-car company make --) of macromolecules The glass balloon:X-39 (Asahi Glass Co., Ltd. make, tradename) 60 weight section which added the tradename 1 weight section, the stearin acid 2 weight section, and the alkylbenzene sulfonic-acid calcium:7764(above) 3 weight section were mulled for 5 minutes after melting of a resin by the 100-degree C roll mill. This was taken out as the shape of a sheet, and was pierced like the example 1, the sample for an examination was produced, same measurement was performed, and the result was shown in Table 5.

[0028] Next, it ground and the pellet was produced, after cooling the above-mentioned sheet-like object to a room temperature. While this was extruded in thickness of 120 micrometers like the example 1, it laminated with the pulp which consists of recovery used paper with 30 micrometers [ in 12g of the basis weights for a lamination/, m2, and thickness ], and a width of face of 700mm, and the lamination sheet of 120 micrometers of \*\*\*\*\*s was obtained. (since [ however, ] the resin has entered into the fiber of paper -- \*\*\*\*\* of a lamination sheet -- it did not become simple total)

About the obtained lamination sheet, it is JIS. When the tension test was performed on the same conditions as the above based on K6734, it was the thing of the intensity which can be enough satisfied as a sheet for agriculture.

[0029]

[Table 5]

		実施例 1	実施例 2	実施例 3
生分解性樹脂	脂肪族ポリエステル 1001	100	100	
	脂肪族ポリエステル 3010			100
	ポリカプロラクトン H7			
	乳酸系 1012			
充 填 剤	炭酸カルシウム	120		
	コーンスターチ		100	
	ガラスバルーン			60
表面処理剤	チタネートカップリング剤	1		
	アセチレングリコール		2	
	シランカップリング剤			1
滑 剤	ステアリン酸	2		2
	アルキルベンゼンスルホン酸Ca	3		3
合 計		226	202	166
物 性	引 張 強 度 (kg/cm <sup>2</sup> )	163	103	85
	100% Mod. (kg/cm <sup>2</sup> )	149	93	78
	伸 び (%)	216	221	188

[0030] In addition, although the amount of [ of paper ] fiber remained a little three months after when the lamination sheet obtained in the above-mentioned examples 1-3 was cut on 20cm square, and it laid underground into the leaf mold and was left in the 33 degree-Cx75% thermostatic chamber of RH, decomposition was advancing considerably.

[0031]

[Effect of the invention] According to the biodegradability sheet for agriculture of this invention, even if it adds so much the bulking agent by which surface treatment was carried out in biodegradability polyester resin, a fall of physical properties is suppressed, and by laminating this resin by paper or the nonwoven fabric further, even if it is cheap and it moreover makes a resin layer thin, sufficient intensity is obtained. Moreover, since necessary minimum is sufficient as the thickness of the resin layer which constitutes the biodegradability sheet for agriculture, paper, or a nonwoven fabric, the decomposition by the microorganism becomes quicker [ the catabolic rate at the time of laying underground among soil is quick, and ], since hydrolysis in soil will be promoted, if the alkaline bulking agent is added, and if the starchy bulking agent is added, the decomposition by the microorganism can be made still quick. Furthermore, since the resin laminates the biodegradability sheet for agriculture of this invention as compared with the case of only paper, even if it is damp to rain, it does not cause an on-the-strength fall and is not torn at the time of use. Moreover, the calorific value when destroying by fire does not damage about 1/2 and the incinerator of a usual biodegradability resin, either, and processing after use is easy for it.

[Translation done.]

## \* NOTICES \*

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2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## MEANS

[The means for solving a technical problem] In order to solve the above-mentioned technical problem, as a result of repeating a research zealously, by fabricating the sheet which laminated the resin material which comes to add a bulking agent, and the paper or the nonwoven fabric of the amount of specialization by which surface treatment was carried out to biodegradability aliphatic polyester resin, this invention persons find out the practically very desirable biodegradability sheet for agriculture, and came to complete this invention. That is, the biodegradability sheet for agriculture of this invention laminates the resin material which comes to carry out 10-150 weight section addition of the bulking agent by which surface treatment was carried out in paper or a nonwoven fabric to the biodegradability resin group polyester resin 100 weight section.

[0006] The bulking agent by which surface treatment was carried out Moreover, a calcium carbonate, a calcium hydroxide, At least one sort chosen from clay, talc, an aluminum hydroxide, and a magnesium hydroxide What carried out surface treatment by at least one sort chosen from a \*\*\*\*\* coupling agent, an aluminum coupling agent, an acetylene glycol, and its derivative, Or at least one sort chosen from the ashes which may have the paper manufacture sludge which makes a principal component a silica, a ceramic balloon, a glass balloon, a glass bead, and a silica incinerated The thing which carried out surface treatment by the epoxy system silane coupling agent, or the thing which carried out surface treatment of the starch by at least one sort chosen from an acetylene glycol and its derivative is adopted preferably. By using these bulking agents by which surface treatment was carried out, a physical-properties fall is suppressed and high restoration to a biodegradability material is enabled. Furthermore, for the paper or the nonwoven fabric to laminate, the basis weight is 5-50g/m<sup>2</sup>. It is more desirable than an intensity top that it is within the limits. The well-balanced suitable sheet for biodegradability agriculture can be obtained by adopting these configurations.

[0007]

[Gestalt of implementation of invention] Hereafter, this invention is explained in detail. The biodegradability aliphatic polyester resin used for this invention Although it is not limited especially if it has a biodegradability, specifically The multiple-valued carboxylic acids illustrated by a malonic acid, a succinic acid, a glutaric acid, an adipic acid, a sebacic acid, a fumaric acid, a maleic acid, dodecanoic acid, the malic acid, the tartaric acid, the citric acid, etc., these anhydrides, etc., Ethylene glycol, a propylene glycol, butanediol, hexanediol, The condensation-polymerization object with polyhydric alcohol, such as octanediol, the Deccan diol, a glycerol, and a trimethylol propane The condensation-polymerization object of a hydroxy acid like the ring-opening-polymerization object (poly caprolactone) of cyclic ester, such as a lactide which is the annular dimer of a lactic acid, and epsilon-caprolactone, a lactic acid, hydroxybutyric acid, and a hydroxy valeric acid is illustrated, and it is used as one sort or two sorts or more of mixture.

[0008] The bulking agent used for this invention has an inorganic bulking agent and an organic bulking agent, the incineration ashes of a calcium carbonate, a calcium hydroxide, clay, talc, an aluminum hydroxide, a magnesium hydroxide, a silica, a ceramic balloon, a glass balloon or a glass bead, and paper manufacture sludge etc. are mentioned as an inorganic bulking agent, and starchy chaff powder [ , such as powder, ], such as a potato, a sweet potato, wheat, a Zea mays, tapioca, and rice bran, is mentioned as an organic bulking agent. These bulking agents are used as one sort or two sorts or more of mixture, and can complement a property mutually by mixing.

[0009] Among these, it is more desirable not to make the surface treatment by the fatty acid etc., although any of the quality of heavy and light \*\* colloid will be sufficient and the thing of surface treatment will be used about a calcium carbonate, if a mean particle diameter is 0.1-6 micrometers. Moreover, since influence appears in the viscosity at the time of molding, and physical properties, as for the calcium carbonate with a small particle size, it is more desirable [ the differentiation in the specific surface area by the size of particle size ] than the calcium carbonate with a big particle size to lessen an addition. The thing of the same particle size as a calcium carbonate and surface treatment is used also about a calcium hydroxide, clay, talc, an aluminum hydroxide, a magnesium hydroxide, or a silica.

[0010] About a ceramic balloon, a glass balloon, and a glass bead, the thing of the domain whose mean particle diameter is 1-30 micrometers is good. These spherical bulking agents have the small viscosity elevation at the time of restoration, since especially a ceramic balloon and a glass balloon are hollow, its specific gravity is small, and since the specific gravity of a biodegradability resin also becomes small by this addition, it becomes advantageous in respect of a cost. Moreover, if the ceramic balloon of a true sphere and a glass balloon are used, since a directivity will not appear in a biodegradability resin by this addition, there is an advantage from which the product which does not have a directivity in the case of molding is obtained.

[0011] the starch as an organic bulking agent may be a potato, a sweet potato, wheat, a Zea mays, tapioca, rice bran, etc., and




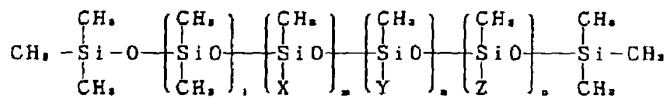
although various configurations are taken, the content of an amylose and an amylopectin differs also from its polymerization degree and various particle size also comes out according to the modality of the material, as long as a mean particle diameter is within the limits of 0.1-30 micrometers, it may be which starch Moreover, since starch has slippage and it can give the slippage at the time of molding to the mixture with a biodegradability resin, without adding a lubricant, it becomes advantageous in respect of the time of combination, or a cost.

[0012] As a surface treatment agent for carrying out surface treatment of these bulking agents, in the case of the paper manufacture sludge incineration ashes and the silica to which a bulking agent makes a principal component a ceramic balloon, a glass balloon, a glass bead, and a silica, an epoxy system silane coupling agent (Table 1) is good, and when it is inorganic bulking agents other than these, a \*\*\*\*\* system coupling agent (Table 2), an aluminum coupling agent (Table 3) or an acetylene glycol, and this derivative (Table 4) are suitable for it.

[0013] In these, the inorganic fraction of this coupling agent carries out orientation of an epoxy system silane coupling agent and the \*\*\*\*\* system coupling agent to an inorganic bulking agent, and the type where an organic fraction goes into a resin is taken. That is, it becomes the structure which wrapped the inorganic substance in the organic substance, and uniform variance is attained, and since a physical-properties fall can be made into the minimum, it is preferably adopted by the interaction with a resin.

[0014]

[Table 1]

	化 学 名	構 造 式
KEM503	$\beta$ -(3,4-エポキシシクロヘキシル) エチルトリメトキシシラン	 -C <sub>2</sub> H <sub>4</sub> Si(OC <sub>2</sub> H <sub>5</sub> ) <sub>3</sub>
KEM403	$\gamma$ -グリシドキシプロピル トリメトキシシラン	 -CH <sub>2</sub> CH <sub>2</sub> OC <sub>2</sub> H <sub>5</sub> Si(OC <sub>2</sub> H <sub>5</sub> ) <sub>3</sub>
KBE402	$\gamma$ -グリシドキシプロピル メチルジエトキシシラン	 -CH <sub>2</sub> CH <sub>2</sub> OC <sub>2</sub> H <sub>5</sub> Si(OC <sub>2</sub> H <sub>5</sub> ) <sub>2</sub> CH <sub>3</sub>
MAC 2101	マイクロモレキュラーカップリング剤  X: アルコキシシリル基, 1, m, n, o: それぞれ正の整数 Y: 反応性有機官能基 (エポキシ基) Z: 有機物との相溶性を高める官能基 (ポリエーテル、アルキル、アラルキル基等)	

[0015]

[Table 2]

化 学 名	構 造 式
イソプロピル トリオクタノイルチタネート	$\text{CH}_3 - \overset{\text{CH}_3}{\underset{ }{\text{CH}}} - \text{O} - \text{Ti} \left\{ \text{O} - \overset{\text{O}}{\parallel} \text{C} - \text{C}_8\text{H}_{17} \right\}_3$
イソプロピルジメタクリロイル イソステアロイルチタネート	$\text{CH}_3 - \overset{\text{CH}_3}{\underset{ }{\text{CH}}} - \text{O} - \text{Ti} \left\{ \begin{array}{l} \text{O} - \overset{\text{O}}{\parallel} \text{C} - \text{C}_{17}\text{H}_{35} \\ \text{O} - \overset{\text{O}}{\parallel} \text{C} - \text{C}(\text{CH}_3) = \text{CH}_2 \end{array} \right\}_2$
イソプロピルトリ (ドデシルベン ゼンスルホニル) チタネート	$\text{CH}_3 - \overset{\text{CH}_3}{\underset{ }{\text{CH}}} - \text{O} - \text{Ti} \left\{ \text{O} - \overset{\text{O}}{\parallel} \text{S} - \text{C}_6\text{H}_4 - \text{C}_{12}\text{H}_{25} \right\}_3$
イソプロピルイソステアロイル ジアクリロイルチタネート	$\text{CH}_3 - \overset{\text{CH}_3}{\underset{ }{\text{CH}}} - \text{O} - \text{Ti} \left\{ \begin{array}{l} \text{O} - \overset{\text{O}}{\parallel} \text{C} - \text{C}_{17}\text{H}_{35} \\ \text{O} - \overset{\text{O}}{\parallel} \text{C} - \text{CH} = \text{CH}_2 \end{array} \right\}_2$
イソプロピルトリ (ジオクチル ホスフェート) チタネート	$\text{CH}_3 - \overset{\text{CH}_3}{\underset{ }{\text{CH}}} - \text{O} - \text{Ti} \left\{ \text{O} - \overset{\text{O}}{\parallel} \text{P} - (\text{O} - \text{C}_8\text{H}_{17})_2 \right\}_3$
イソプロピルトリクミルフェニ ルチタネート	$\text{CH}_3 - \overset{\text{CH}_3}{\underset{ }{\text{CH}}} - \text{O} - \text{Ti} \left\{ \text{O} - \text{C}_6\text{H}_4 - \overset{\text{CH}_3}{\underset{\text{CH}_3}{\text{C}}} - \text{C}_6\text{H}_4 \right\}_3$
テトライソプロピルビス (ジオ クチルホスファイト) チタネート	$(\text{CH}_3 - \overset{\text{CH}_3}{\underset{ }{\text{CH}}} - \text{O})_2 - \text{Ti} \cdot [\text{P} - (\text{O} - \text{C}_8\text{H}_{17})_2 (\text{OH})]_2$

[0016]

[Table 3]

化 学 名	化 学 構 造 式
アセトアルコキシ アルミニウム ジイソプロピレート	$\begin{array}{c} \text{CH}_3 \\   \\ \text{CH}_3 - \text{CH} - \text{O} \\   \\ \text{CH}_3 \end{array} \quad \begin{array}{c} \text{O} \\ \diagup \quad \diagdown \\ \text{Al} \\ \diagdown \quad \diagup \\ \text{O} \end{array} \quad \begin{array}{c} \text{O} - \text{C} - \text{CH}_3 \\   \\ \text{CH} \\   \\ \text{O} = \text{C} - \text{OR} \end{array}$

[0017]

[Table 4]

化 学 名	構 造 式	商 品 名
2, 4, 7, 9- テトラメチル-5- デシン-4, 7- ジオール (I)	$  \begin{array}{ccccccc}  \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 \\    & &   & &   & &   \\  \text{CH}_3 - \text{CH} - \text{CH}_2 - & \text{C} \equiv \text{C} & - \text{C} - \text{CH}_2 - & \text{CH} - \text{CH}_3 \\    & &   \\  \text{OH} & & \text{OH}  \end{array}  $	Surfynol 104 (特-741-特 104)
(I) のブレンド		Surfynol 104E (特-741-特 104E)
		Surfynol 104B (特-741-特 104B)
		Surfynol 104A (特-741-特 104A)
		OLFINE STC (特741) SPG)
		OLFINE SPC (特741) SPC)
(I) の酸化エチレン付加体	$  \begin{array}{ccccccc}  \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 & & \text{CH}_3 \\    & &   & &   & &   \\  \text{CH}_3 - \text{CH} - \text{CH}_2 - & \text{C} \equiv \text{C} & - \text{C} - \text{CH}_2 - & \text{CH} - \text{CH}_3 \\    & &   \\  \text{O} & & \text{O} \\    & &   \\  \text{CH}_2 & & \text{CH}_2 \\    & &   \\  \text{CH}_2 & & \text{CH}_2 \\    & &   \\  \text{O} & & \text{O} \\    & &   \\  \text{H} & & \text{H}  \end{array}  $	$m+n=3.5$ Surfynol 440 (特-741-特 440)
		$m+n=10$ Surfynol 455 (特-741-特 455)
		$m+n=30$ Surfynol 485 (特-741-特 485)
3, 6-ジメチル-4- オクチン-3, 6-ジオール	$  \begin{array}{ccccccc}  \text{CH}_3 & & \text{CH}_3 & & & & \\    & &   & & & & \\  \text{CH}_3 - \text{CH}_2 - & \text{C} \equiv \text{C} & - \text{C} - \text{CH}_2 - & \text{CH}_3 \\    & &   \\  \text{OH} & & \text{OH}  \end{array}  $	Surfynol 82 (特-741-特 82)

[0018] As a starchy surface treatment agent which is an organic bulking agent on the other hand, an acetylene glycol and its derivative are desirable. This acetylene glycol is a powerful surfactant, orientation is carried out to OH base in a starch, and since an organic fraction serves as the type where it faces to a resin, when uniform variance into a resin and an interaction arise, it is thought that a physical-properties fall becomes small. Thus, it cannot expect distributing uniformly the starchy powder which is an organic bulking agent in a resin to a usual surface treatment agent, and it is the big effect of an acetylene glycol.

[0019] About the technique of the surface treatment of these bulking agents, even if it processes the integral blend on a wet method (technique by hydrolysis), dry process, and a roll mill etc. by which technique, it does not interfere. As for the addition of the surface treatment agent in this case, it is desirable that it is within the limits of 0.5-SPHR, by less than 0.5 PHRs, if the effect as a surface treatment agent can seldom expect but exceeds SPHRs conversely, since the surface treatment agent is expensive, low-cost-ization of an addition will become impossible and it will be inferior to economical efficiency in it.

[0020] this invention is that by which the addition of these bulking agents by which surface treatment was carried out is added to the aforementioned biodegradability aliphatic polyester resin 100 weight section according to a property required within the limits of 10 - 150 weight section. The effect which this addition exerts on the viscosity control by addition of a bulking agent, an intensity, a fluidity, etc. under in 10 weight section will decrease, if 150 weight section is exceeded conversely, viscosity will go up too much, a fall of a moldability and physical properties will become remarkable, and practicality will be lost.

[0021] Since the biodegradability aliphatic polyester resin which added the bulking agent by which surface treatment was carried out is what must not usually start a photodegradation at the time of use, it may add the plasticizer for adding an ultraviolet ray absorbent, an antioxidant, etc. and giving the pigment and flexibility for tinction etc. Furthermore, there is still little calorific value, the biodegradability aliphatic polyester resin to which calorific value added the bulking agent by which surface treatment was carried out although biodegradability aliphatic polyester resin was usually about 1, such as polyethylene, 2 is set to 1 / 3 - 1/4, such as polyethylene, and its incineration processing with an incinerator is also satisfactory at all. Moreover, according to the modality of inorganic bulking agent, eight or more alkaline things have pH, and these can promote hydrolysis of a resin in soil and can speed up the catabolic rate by the microorganism. Furthermore, since the resin by the microorganism is made to decompose, the starchy addition which is an organic bulking agent can also expect the effect that decomposition is promoted more.

[0022] A biodegradability sheet is obtained when this invention laminates the resin material which comes to add the bulking agent with which surface treatment of the amount of specialization illustrated above was carried out in paper or a nonwoven fabric to biodegradability aliphatic polyester resin. When it extrudes with the resin material of the above-mentioned biodegradability and being laminated, this paper or nonwoven fabric is used in order to fully enter between the scale divisions of paper or a nonwoven fabric and to strengthen combination with a resin. For this reason, in the comparatively coarse concrete target of scale division, the weighing capacity is 5-50g/m<sup>2</sup>. It is more desirable than an intensity top to use a thing within the limits. The thing of the

non-coating which consists of rayon which is the natural cellulose or regenerated cellulose by which surface treatment is not carried out at all that what is necessary is just what has a biodegradability as paper to laminate, or cellophane is mentioned. Moreover, as a nonwoven fabric, it could be manufactured by any of a wet method or dry process, and fiber should just have a biodegradability. Especially in the case of the nonwoven fabric manufactured with dry process, it is required for the binder used for this to also have a biodegradability.

[0023] the molding using T-die etc. of the resin material which consists of biodegradability aliphatic polyester resin which carried out specified quantity combination of the above-mentioned bulking agent by which surface treatment was carried out in order to have manufactured the biodegradability sheet for agriculture of this invention -- paper or a nonwoven fabric -- extruding -- a lamination -- or a dry laminate is carried out and it is produced by the biodegradability sheet for agriculture

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[Translation done.]



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2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

EXAMPLE

[Example] Hereafter, although this invention is concretely explained based on an example, this invention is not limited only to these publications.

[an example 1] -- aliphatic -- polyester resin:Bionolle 1001 (the Showa High Polymer Co., Ltd. make --) A tradename, 1, the condensation-polymerization object 100 weight section of 4-butanediol and a succinic acid, The whitening 120 weight section of 2 micrometers of the mean particle diameters which added the tetrapod isopropyl screw (dioctyl phosphite) \*\*\*\*\* 1 weight section as a \*\*\*\*\* coupling agent, The stearin acid 2 weight section and the alkylbenzene sulfonic-acid calcium:7764(Akishima chemical-industry company make, tradename) 3 weight section were mulled for 5 minutes after melting of a resin by the 120-degree C roll mill. This was taken out as the shape of a sheet, and it put into the frame mold with a thickness of 2mm, it pressed for 5 minutes at 140 degrees C, and considered as the sheet with a thickness of 2mm. It pierced by the No. 2 dumbbell of JIS convention from this sheet, the test sample was produced, the tension test was performed at the rate of 200mm/min, tensile strength, 100% modulus, and elongation were measured, and the result was shown in Table 5.

[0025] Next, it ground and the pellet was produced, after cooling the aforementioned sheet to a room temperature. While this was extruded in thickness of 40 micrometers using the extruder of 65mm of the diameters of a screw on conditions with 140-230 degrees C [ of cylinder temperatures ], and a die temperature of 235 degrees C, it laminated with the pulp which consists of recovery used paper with 50 micrometers [ in 20g of the basis weights for a lamination/, m2, and thickness ], and a width of face of 700mm, and the lamination sheet of 70 micrometers of \*\*\*\*\*s was obtained. (since [ however, ] the resin has entered into the fiber of paper -- \*\*\*\*\* of a lamination sheet -- it did not become simple total)

About the obtained lamination sheet, it is JIS. When the tension test was performed on the same conditions as the above based on K6734, it was the thing of the intensity which can be enough satisfied as a sheet for agriculture.

[0026] The corn-starch Y100 weight section (Japan Maize Products Co., Ltd. make) which added the [example 2] aliphatic polyester resin:Bionolle 1001 (above) 100 weight section and the ethyleneoxide adduct:\*\*\*\*\* Norian 440(\*\*\*\* chemical-industry company make, tradename) 1 weight section of an acetylene glycol was mulled for 5 minutes after melting of a resin by the 120-degree C roll mill. This was taken out as the shape of a sheet, and was pierced like the example 1, the sample for an examination was produced, same measurement was performed, and the result was shown in Table 5. Next, it ground and the pellet was produced, after cooling the above-mentioned sheet-like object to a room temperature. While this was extruded in thickness of 40 micrometers like the example 1, it laminated with the pulp which consists of recovery used paper with 30 micrometers [ in 12g of the basis weights for a lamination/, m2, and thickness ], and a width of face of 700mm, and the lamination sheet of 50 micrometers of \*\*\*\*\*s was obtained. (since [ however, ] the resin has entered into the fiber of paper -- \*\*\*\*\* of a lamination sheet -- it did not become simple total)

About the obtained lamination sheet, it is JIS. When the tension test was performed on the same conditions as the above based on K6734, it was the thing of the intensity which can be enough satisfied as a sheet for agriculture.

[0027] [an example 3] -- aliphatic -- polyester resin:Bionolle 3010 (the Showa High Polymer Co., Ltd. make --) The copolymer 100 weight section of tradename, 1, and 4-butanediol, a succinic acid, and an adipic acid, amount epoxy system silane-coupling-agent:MAC2101 (Japanese uni-car company make --) of macromolecules The glass balloon:X-39 (Asahi Glass Co., Ltd. make, tradename) 60 weight section which added the tradename 1 weight section, the stearin acid 2 weight section, and the alkylbenzene sulfonic-acid calcium:7764(above) 3 weight section were mulled for 5 minutes after melting of a resin by the 100-degree C roll mill. This was taken out as the shape of a sheet, and was pierced like the example 1, the sample for an examination was produced, same measurement was performed, and the result was shown in Table 5.

[0028] Next, it ground and the pellet was produced, after cooling the above-mentioned sheet-like object to a room temperature. While this was extruded in thickness of 120 micrometers like the example 1, it laminated with the pulp which consists of recovery used paper with 30 micrometers [ in 12g of the basis weights for a lamination/, m2, and thickness ], and a width of face of 700mm, and the lamination sheet of 120 micrometers of \*\*\*\*\*s was obtained. (since [ however, ] the resin has entered into the fiber of paper -- \*\*\*\*\* of a lamination sheet -- it did not become simple total)

About the obtained lamination sheet, it is JIS. When the tension test was performed on the same conditions as the above based on K6734, it was the thing of the intensity which can be enough satisfied as a sheet for agriculture.

[0029]

[Table 5]

		実施例 1	実施例 2	実施例 3
生分解性樹脂	脂肪族ポリエステル 1001	100	100	
	脂肪族ポリエステル 3010			100
	ポリカプロラクトン H7			
	乳酸系 1012			
充 填 剤	炭酸カルシウム	120		
	コーンスターチ		100	
	ガラスバルーン			60
表面処理剤	チタネートカップリング剤	1		
	アセチレングリコール		2	
	シランカップリング剤			1
滑 剤	ステアリン酸	2		2
	アルキルベンゼンスルホン酸Ca	3		3
合 計		226	202	166
物 性	引 張 強 度 (kg/cm <sup>2</sup> )	163	103	85
	100% Mod. (kg/cm <sup>2</sup> )	149	93	78
	伸 び (%)	216	221	188

[0030] In addition, although the amount of [ of paper ] fiber remained a little three months after when the lamination sheet obtained in the above-mentioned examples 1-3 was cut on 20cm square, and it laid underground into the leaf mold and was left in the 33 degree-Cx75% thermostatic chamber of RH, decomposition was advancing considerably.

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[Translation done.]